

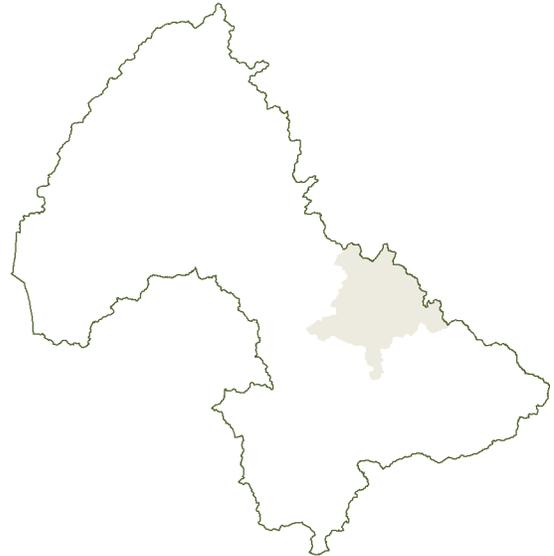
5.6 Black River Ecological Region

5.6.1 Overview

The Black River Ecological Region encompasses the Black River and its tributaries, such as Waddell and Beaver creeks and the Scatter Creek and Prairie Creek independent drainages (Figure 5-11). This ecological region encompasses 200 square miles (greater than 127,000 acres) and represents approximately 7% of the overall Chehalis Basin. The highest point in this ecological region is Capitol Peak at 2,659 feet in the Capitol State Forest. The Black River arises in the low-elevation divide between the Chehalis Basin and Puget Sound at Black Lake, at 131 feet in elevation, and the low adjacent hills, at approximately 180 feet in elevation. Waddell Creek arises in the Capitol State Forest at approximately 450 feet in elevation.

The geologic landscape of the Black River Ecological Region was largely formed from the deposition of materials from continental glaciation. The Puget Lobe of the Cordilleran Ice Sheet extended into the Chehalis Basin at least twice, with the deposition of a terminal moraine north of Rochester (Gendaszek 2011). As the Puget Lobe retreated, meltwater channels drained south, creating a series of channels and valleys and depositing recessional glacial outwash in the Chehalis River and its tributaries (Skookumchuck River, Black River, Satsop River, and Scatter Creek; Gendaszek 2011). The Black River Ecological Region has glacial lakes and relatively large areas of wetlands that make this ecological region unique.

Precipitation in the Black River Ecological Region is dominated by rainfall. Average annual precipitation is 45 to 75 inches. Generally, this part of the Chehalis Basin receives less precipitation and includes low-elevation areas along the I-5 corridor.



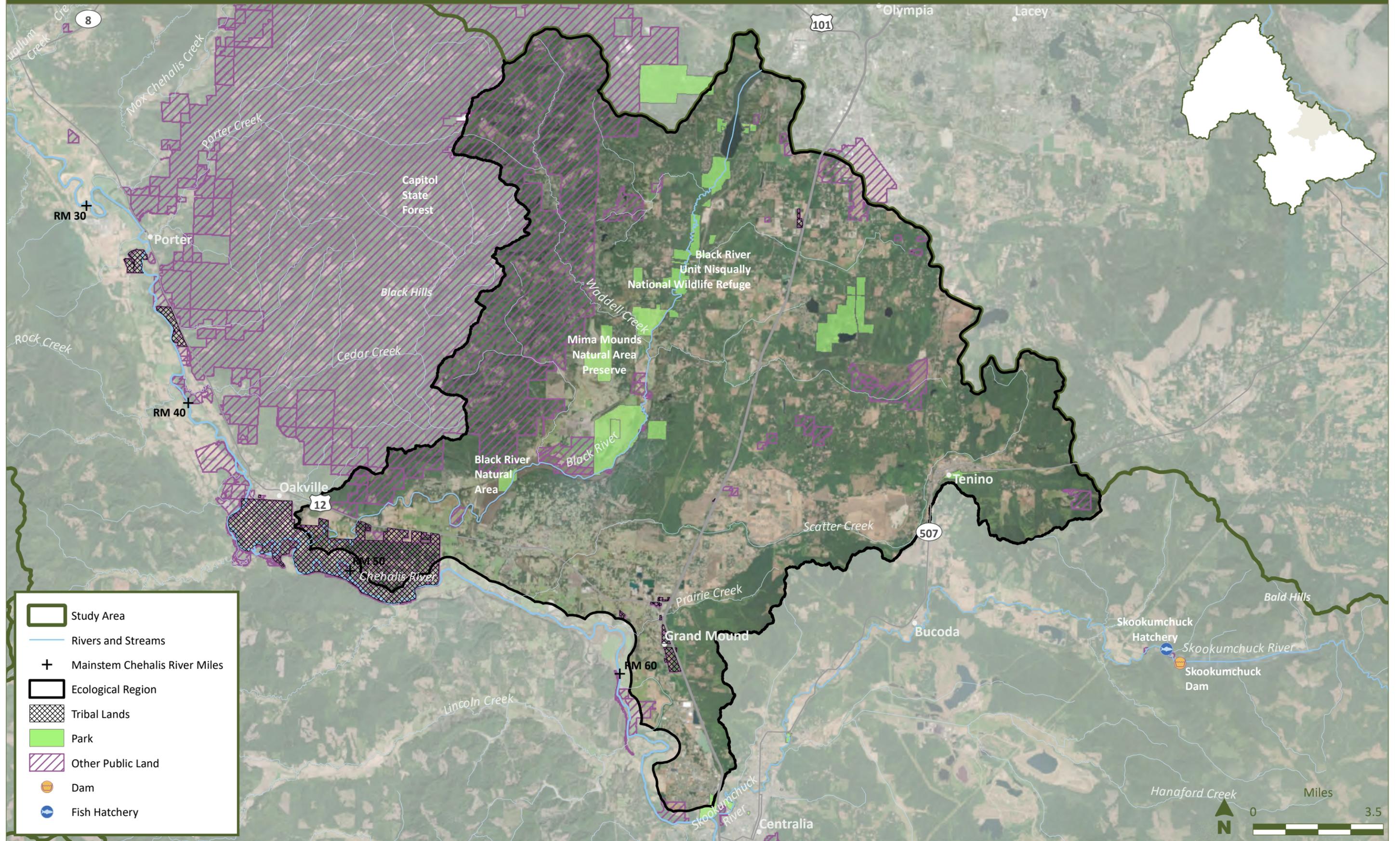
Important Features and Functions

- Extensive low-gradient wetland complexes found in the Black River Ecological Region are currently unique in the Chehalis Basin. There may be springs and groundwater inputs.
- State wildlife lands and extensive marsh systems limit land development in much of this ecological region, which offers important protections to aquatic species.
- The presence of Oregon spotted frog is unique to this ecological region. Olympic mudminnow is also widespread and has frequent co-occurrence with Oregon spotted frog.
- West Rocky Prairie is a unique area with several types of headwater prairie habitats that support multiple sensitive species.
- Stream temperature is particularly important to summer habitat for juvenile coho salmon and summer holding habitat for adult spring-run Chinook salmon.
- This ecological region has the highest development pressure within the basin.

*Ecological Regions:
Black River Ecological Region*

The Black River Ecological Region is primarily within Thurston County (119,953 acres, or 94%), with smaller portions in Grays Harbor County (3,988 acres, or 3%) and Lewis County (3,280 acres, or 3%). Cities and towns within this ecological region include Rochester, Tenino, Grand Mound, Littlerock, Maytown, and parts of Olympia.

Figure 5-11
Black River Ecological Region Map



Aerial Photo Source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

5.6.2 Historical Conditions and Changes

Historical records of the pre-Euro-American settlement conditions are not available, but available historical records and GLO maps from 1856 indicate that the Black River Ecological Region was dominated by gravelly prairies with a large area of swamp (alder, willow, and spruce) around the upper Black River (WNPS 1994). It is likely there were an abundance of beaver and beaver ponds. Key changes that occurred in the Black River Ecological Region following Euro-American settlement were agricultural, residential/commercial, and major transportation corridor (including I-5, SR 12, and railroad lines) development. Agricultural development as well as road, bridge, and residential construction likely also incrementally moved and straightened some of the rivers and creeks in the Black River Ecological Region over time.

To support the ASRP analysis and EDT modeling, the SRT developed assumptions of the channel lengths and areas of floodplain habitat that were likely to be present in historical conditions. These assumptions were based on the GLO mapping from the late 1800s, more recent historical aerial photographs, and interpretation of current LiDAR data that show remnant channels and other floodplain features. The Black River and its east-side tributaries are unconfined and very low gradient within a wide glacial plain.

Compared to historical conditions, the river channel length does not appear to be significantly reduced, but side channels would have historically been far more prevalent, and the river would have had up to 3 times the area of frequently connected floodplain. Large wood has been removed, and the riparian zone is patchy. However, the Black River retains much of its wetland characteristics in multiple reaches, maintaining high-quality habitat.



Scatter Creek was an important historical habitat for salmon and other indicator species. This area is currently threatened by impaired riparian function, loss of floodplain habitats, and low flows. Scatter Creek could be enhanced by protection of flows and restoration of beaver habitat and wood.



The low-gradient and meandering Black River, along with Scatter and Prairie creeks, formerly supported significant runs of chum and coho salmon, but these populations are now reduced.

5.6.3 Current Conditions

Current conditions reflect ongoing forest management, agricultural land uses, and residential and commercial development. Land cover in the Black River Ecological Region is approximately 22% coniferous forest, 16% developed, 15% agriculture, 14% scrub-shrub, 10% mixed forest, 8% wetland, 7% deciduous forest, 7% grassland, and small percentages of other cover²¹ (Figure 5-12).

The Black River still retains a mosaic of riparian areas and palustrine forested, scrub-shrub, and emergent wetlands that represent one of the largest remaining relatively undisturbed freshwater wetland systems in the Puget Sound region (USFWS 2018). A wide corridor of wetlands is present along the Black River, downstream from Black Lake, for approximately 7 miles; much of this wetland area is protected in the Black River Unit of the Nisqually National Wildlife Refuge. Another significant area of wetlands is present along the Black River from RM 10 to RM 16 within the Glacial Heritage Preserve and Black River Natural Area. Tributaries such as Salmon and Beaver creeks retain large wetland areas (Ecology 2011b). Scatter Creek also retains a large component of floodplain remnant wet prairies. An assessment of riparian conditions and functions by NOAA (Beechie 2018) indicates that the majority of the riparian areas in the Black River Ecological Region are impaired for wood recruitment, with less than 5% functioning due to the young age of trees. In the U.S. Fish and Wildlife Service (USFWS 1993) assessment of the Chehalis Basin, a large quantity of wood was noted in Waddell and Mima creeks. A moderate number of beaver dams were noted in those creeks as well. Levels of shading are moderately impaired on the Black River (Beechie 2018).

Black River Current Snapshot

Condition of Watershed Processes:

Hydrology –impaired
Floodplain connectivity – moderately impaired
Riparian condition – moderately impaired
Water quality – impaired

Restoration Potential: High

Protection Potential: Moderate

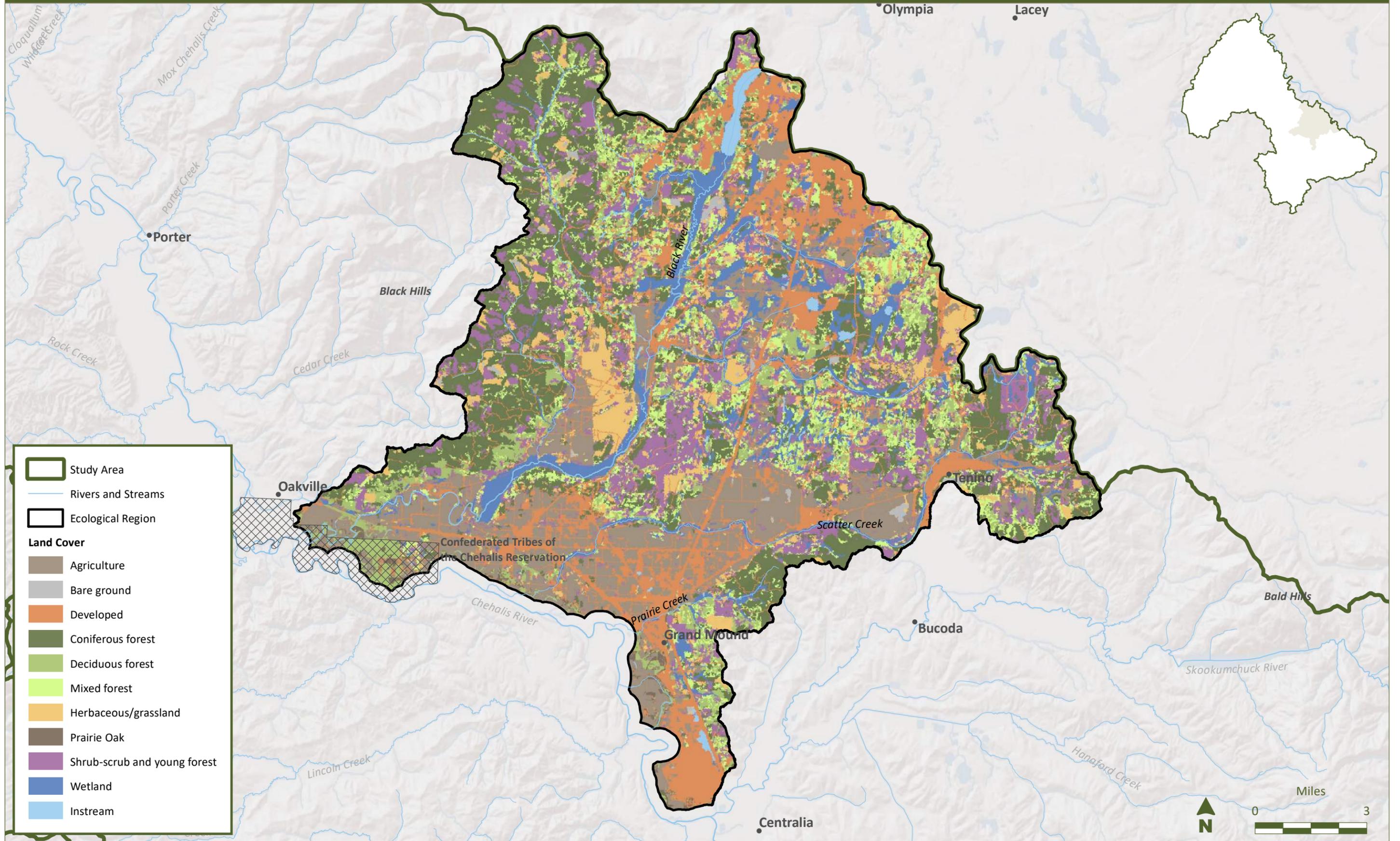
Geographic Spatial Units: Upper Black River, Lower Black River, Prairie Creek, and Scatter Creek

Salmon Use and Potential: Fall-run Chinook salmon, coho salmon, chum salmon, and steelhead

Non-Salmon Use and Potential: Coastal tailed frog, Oregon spotted frog, northern red-legged frog, Western toad, North American beaver, Olympic mudminnow, largescale sucker, mountain whitefish, Pacific lamprey, riffle and reticulate sculpin, speckled dace, great blue heron, Barrow’s goldeneye, common goldeneye, and wood duck

²¹ Land cover data from Multi-Resolution Land Characteristics Consortium, National Land Cover Database 2011, augmented by WDFW Habitat Guild 2015 floodplain data where available.

Figure 5-12
Black River Ecological Region Land Cover



Water quality is impaired in multiple reaches in the Black River Ecological Region, primarily for temperature, low dissolved oxygen, pH, and bacteria (Ecology 2018). Recent temperature monitoring in the Black River (RM 2.5 and 7.2) by WDFW indicates that temperatures regularly exceed water quality standards (16°C [61°F] core summer salmonid habitat) from May through September,²² and they typically exceed the 13°C (55°F) supplemental spawning incubation criterion (September 15 to July 1) from May to July (Ecology 2016, 2011a). The *Upper Chehalis River Basin Temperature TMDL* (Ecology 2001) has designated a goal of 18°C (64°F) for the Chehalis River, with the primary goals of increasing shading on the Black River by 30% and reducing the width of the Black River by 60%.

WDFW's Thermalscape model indicates that from 2013 to 2018, the majority of stream reaches of the Black River Ecological Region (ranging from 72% [2018] to 95% [2014, 2015, and 2017] of the reaches) had mean August temperatures equal to or exceeding 16°C (61°F) and are projected to increase to 96% and 98% of the reaches in 2040 and 2080, respectively, without restoration actions (Winkowski and Zimmerman 2019).

The NOAA model that incorporates mature riparian conditions and anticipated climate change shows a likely future increase in summer water temperatures ranging from 1.5°C (2.7°F) to more than 2.5°C (4.5°F) by 2080 in the Black River Ecological Region (Beechie 2018).

A high concentration of groundwater wells are present in the Black River Ecological Region, and the Black River and Scatter Creek have been closed to further consumptive water uses during the summer (QIN 2016).

Historical and current areas of floodplain marsh and pond habitats were documented by NOAA using GLO mapping (Beechie 2018). They found the Black River sub-basin has lost or had significant modifications to approximately 65% of its marsh habitats, but it has much of the historical pond habitat (although it has been changed from natural ponds to modified ponds). In Scatter Creek, approximately 50% of the historical marsh habitat and 70% of the historical beaver pond habitat have been lost.

More than 50 fish passage barriers were incorporated into the EDT model²³ for the Black River Ecological Region, primarily located on tributaries.

The percentage of fine sediment in streams was modeled by NOAA based on the density of roads and land uses; this modeling indicated 19% to 22% fines are likely to be present in the Black River and Scatter Creek, which is only a slight increase from modeled historical conditions of 17% to 21% fines (Beechie 2018).

Salmon species present in the Black River Ecological Region include fall-run Chinook salmon, coho salmon, chum salmon, and steelhead. The Washington Department of Fisheries (1975) noted that the Black River and Scatter and Prairie creeks formerly supported significant runs of chum salmon, but these

²² Temperatures regularly exceed 23°C (73°F) in the Black River in July and August (WDFW gage data).

²³ Fish passage barrier data from WDFW processed through EDT model.

populations are much reduced now. They also noted that the lower Black River had high numbers of predatory fish. Non-salmon indicator species present include Western toad, coastal tailed frog, Oregon spotted frog, northern red-legged frog, North American beaver, Olympic mudminnow, largescale sucker, mountain whitefish, Pacific lamprey, riffle and reticulate sculpin, and speckled dace. The Black River Ecological Region is the only known area in which the Oregon spotted frog occurs in the Chehalis Basin and one of only six known locations in Washington (WDFW 2012). The bird indicator species present include great blue heron, Barrow's goldeneye, common goldeneye, and wood duck.

Each year, Littlerock Elementary School releases coho salmon fry (about 500 fish) into Beaver Creek. The fish are less than 1 gram per fish at the time of their release. The fish are too small to mark but are not believed to contribute to adult returns.

5.6.4 Limiting Factors

Limiting factors for salmonids have been identified in several assessments of the Chehalis Basin, including the EDT (ICF 2019) and NOAA modeling (Beechie 2018) conducted for the ASRP and earlier studies (GHLE 2011; Smith and Wenger 2001). Additional limiting factors and a diagnosis of what is working and what is broken in the ecological region were determined by the SRT, drawing on local basin knowledge and reconnaissance conducted within the region.

The combined results of these assessments indicate that the major issues for salmonids in the region are as follows (in relative order of importance):

- High water temperature
- Reduced quantity and quality of instream habitats
- Low habitat diversity (lack of side channels, large wood, floodplain connectivity, and beaver ponds)
- Fish passage barriers
- Sediment conditions (fine sediments)
- Predation (non-native fish species and bullfrogs)
- Low flows
- Channel instability

Diagnostic Snapshot

- The ecological region is lacking wood nearly everywhere.
- Substantial channel length lacks stable gravel.
- Invasive plant species, including reed canarygrass, are present.
- The extensive, relatively intact marsh habitat and lakes are high protection priorities.
- The entire ecological region is vulnerable to development impacts from the greater Olympia-Tumwater area.
- The Black River has been channelized and widened, and possible impacts of those modifications have not been evaluated.
- Scatter Creek instream flows may be impacted by groundwater pumping and the historical diversion of one of its headwater tributaries outside of the basin. Some reaches go dry in summer and fall months.

These identified issues for salmonids are consistent with earlier findings from Smith and Wenger (2001) and the Chehalis Basin Lead Entity (GHLE 2011), which indicated that the key limiting factors in this

ecological region include riparian conditions, water quality, water quantity, floodplain conditions, lack of large wood, gravel (sediment) conditions, and fish passage barriers.

Limiting factors and threats to non-salmon indicator species are not well understood but may include high water temperatures, migration barriers, changes in flow conditions and water level variations, fine sediments, riparian conditions, and non-native predator species (as identified for Pacific lamprey by Clemens et al. [2017]).

5.6.5 Strategies and Actions in the Ecological Region

5.6.5.1 Habitat and Process Protection

Many of the protection actions described in Section 4.2.1 are appropriate in the Black River Ecological Region, particularly acquisitions and easements to protect high-quality habitats and unique features. Based on existing conditions, the following areas and actions are recommended for a protection focus:

- Ensure continued protection of Oregon spotted frog habitat (ponds and marshes). Protect headwaters of already protected prairie marshes.
- Identify and protect areas with cool-water and groundwater inputs.
- Protect instream flows and groundwater tables by reducing or preventing surface or groundwater withdrawals.
- Protect functioning wet prairie, floodplain, and marsh habitats, especially in the Allen Creek area.

The majority of the Black River Ecological Region is within Thurston County, which has regulations in place to protect water quantity and quality; maintain or increase forest cover; establish and protect riparian habitat; protect streams, wetlands, floodplains, and prairies from development; limit impervious surfaces; and allow channel migration.



A mosaic of riparian areas and palustrine forested, scrub-shrub, and emergent wetlands in the ecological region represent one of the largest remaining relatively undisturbed freshwater wetland systems in the Puget Sound region. The extensive associated wetland system should be further protected and enhanced.



The Black River Ecological Region is the location of the only known area in which Oregon spotted frog occur in the Chehalis Basin, and it is one of only six such areas in Washington. West Rocky Prairie, one of several known Oregon spotted frog-occupied sites in this ecological region, is an example of marsh and pond habitats that should be targeted for protection and restoration.

As part of the community planning strategy (see Section 5.6.5.3), funding support to align the County regulations with the ASRP and conduct enforcement will be considered.

General protection priorities for Thurston County in the Black River Ecological Region are as follows:

- Protect rocky glacial outwash wetlands/prairies from development and groundwater withdrawals and limit impervious surfaces.
- Protect wetlands/floodplains associated with the Black River and tributaries from development and surface and groundwater withdrawals.
- Maintain spawning gravels and sources by increasing wood recruitment and allowing channel migration.

5.6.5.2 Restoration

The restoration actions described in Section 4.2.2 are all appropriate in the Black River Ecological Region. Based on existing conditions, the following areas and actions are recommended for a restoration focus:

- Ensure continued restoration/management of Oregon spotted frog habitat (ponds and marshes).
- Reduce or prevent surface or groundwater withdrawals that could decrease instream flows, including reconnecting diverted tributaries, particularly in systems like Scatter Creek.
- Restore riparian areas along the Black River, lowland tributaries, and Scatter and Prairie creeks.
- Install large wood structures with the objective of restoring anabranching channel patterns where appropriate and promoting beaver ponds.

Priority restoration areas in the Black River Ecological Region include both the lower and upper Black River and Dempsey, Beaver, Allen, Waddell, and Scatter creeks.

5.6.5.3 Community Planning

As noted in Section 4.2.3, community planning actions would be coordinated with state and local governments, landowners, and other stakeholders to ensure the long-term success of the ASRP. Focus programs and policies that could be developed or investigated in the Black River Ecological Region include the following:

- Discuss with Thurston County additional planning measures that could effectively promote and protect the following:
 - Floodplain connectivity
 - Surface and groundwater through reduction of withdrawals
 - Improved wood recruitment for retention of spawning gravel and sources

- As the Chehalis Basin Strategy becomes more integrated, coordinate the ASRP with the CFAR Program to build habitat restoration and protection actions into community flood risk reduction efforts (such as restoring areas where structures and people have been relocated from floodplains).

5.6.5.4 Community Involvement

As noted in Section 4.2.4, community involvement and voluntary landowner participation are essential to the success of the ASRP, and the actions described in that section will be further evaluated for the Black River Ecological Region in Phases 2 and 3 based on the restoration and protection scenario selected. Based on the specific issues in this area, the following actions are recommended for focused community involvement:

- Continue outreach, engagement, and involvement processes to incorporate landowner expertise into ASRP planning and local implementation efforts.
- Partner with and support the efforts of existing local organizations (see Appendix E for a list of potential partner organizations).

5.6.5.5 Institutional Capacity

The institutional capacity strategy is intended to build on and support the work of existing organizations, as well as support creativity in how local organizations approach working toward the goals of the ASRP. The actions described in Section 4.2.5 will be further evaluated for the Black River Ecological Region in Phases 2 and 3 based on the restoration and protection scenario selected. Based on the specific issues in this area, the following focused institutional capacity actions are recommended:

- Provide technical training on process-based restoration practices and principles.
- Provide funding for groups and individuals interested in restoration projects.
- Build on and support the work of existing organizations with missions that overlap with the ASRP vision (see Appendix E for a list of potential groups).